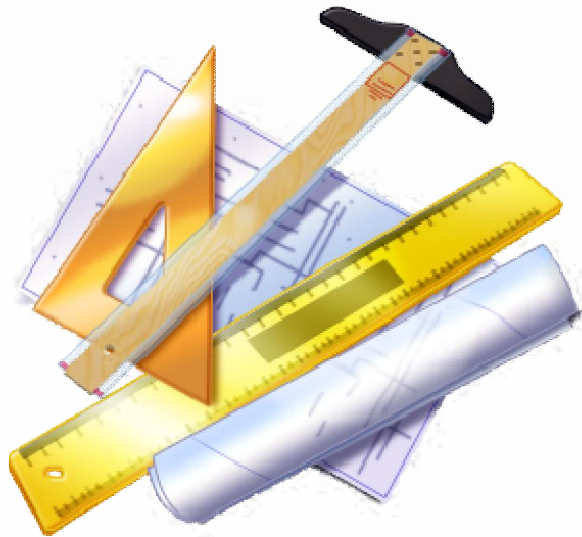




Precast Concrete Pavement

Design Perspective



David Eixenberger, SE

TYLIN INTERNATIONAL
engineers | planners | scientists





Special Thanks

to those willing to promote new ideas

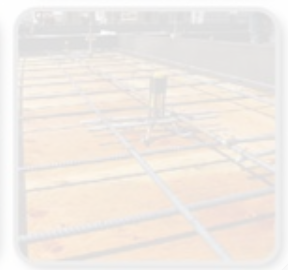
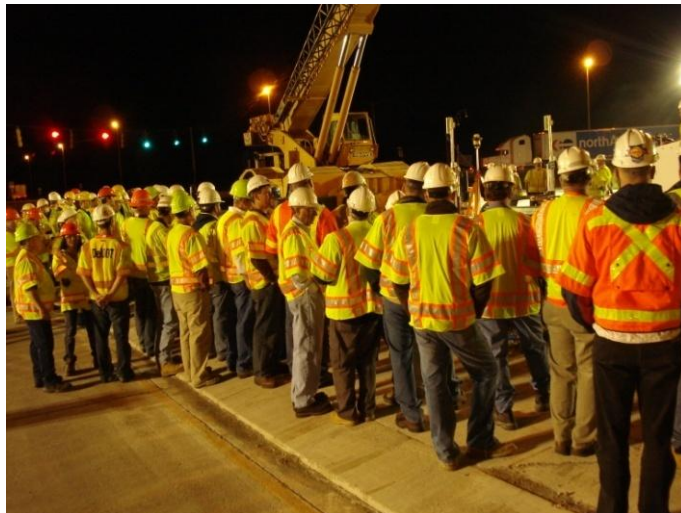
- *Highways for Life program and leaders for tremendous support to Utah and other states.*
- *Matt Zundel – UDOT Project Manager*
- *Daniel Hsiao – UDOT R&D Manager*
- *John Montoya – UDOT Construction Engineer*
- *Amalia Deslis – Showcase Organizer*
- *Contractors, fabricators, and numerous project team members.*
- *Input from attendees, consultants and contractors on providing ideas for new concepts and opportunities.*





Highways for Life Process

- Project began with Scanning Tour to other States.
- Follow up with Lessons Learned Report (Tim Biel)
- Brainstorming on New Ideas
- Implementation Plan for Projects – Proprietary and Alternates.
- *Challenge: Participants should look for opportunities to implement lessons learned in their own State.*





Goals of Project

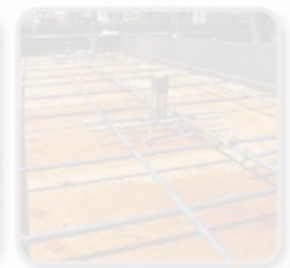
- *Apply to a Real World Project – not just a test section.*
- *Rapid Construction that limits traffic impacts.*
- *Create another “tool in the toolbox”.*
- *Develop options for proprietary and non-proprietary alternatives.*
- *Evaluate innovative ideas to improve.*
- *Provide a cost effective, durable product.*





Project Overview

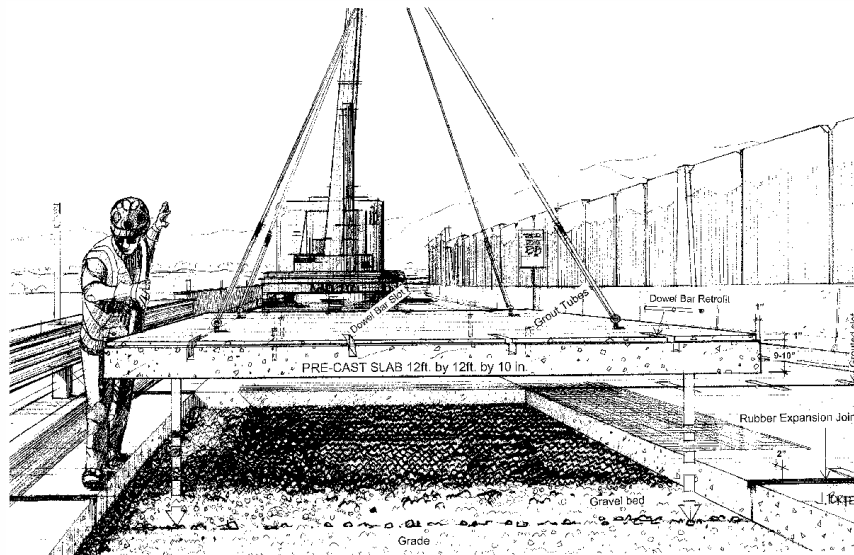
- *I-215, East side of SLC, Utah, between 39th and 45th South.*
- *Orig. Construction – 1971. nearly 40 years old.*
- *Distress: fractured pavement, lack of support, corner cracks, polished surface, etc.*
- *Need to minimize traffic delays - heavy commuter route.*
- *Solution: Use Precast Concrete Pavement Panels to match surrounding pavement type.*





Design Approach

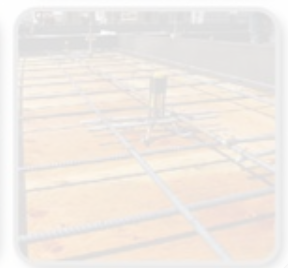
- *Held Brainstorming meetings with UDOT engineers, fabricators, consultants and contractors to discuss lessons learned from scanning tours.*
- *Developed concept plans and approach to work.*
- *Build 2 Prototypes for evaluation of casting, lifting, grout, etc.*
- *Placed 6 test panels (Fall 2010) to evaluate over winter.*
- *Current project to place approximately 45 panels.*





Design Challenges

- *Geometry and fit*
- *Lifting of panels (weight, devices, etc)*
- *Leveling of Panels, base preparation and profile*
- *Grout Materials*
- *Load Distribution and Transfer between panels*

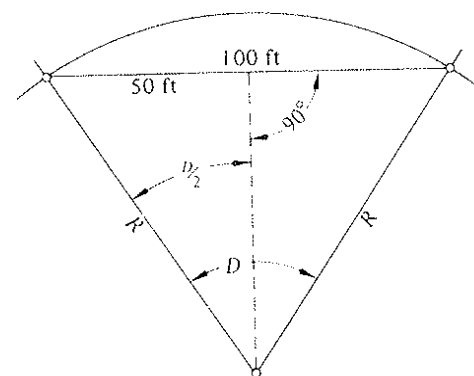




Technical Issue

Curved Horizontal Alignment

- Wanted flexibility for starting and stopping points of project.
- Curved horizontal alignment creates potential for fit issues.
- Calculated Chord offset = $\frac{1}{4}$ inch.
- Question to curved panels or install as square chords?
- **Decision:** Use 12 ft straight panels and vary joint width. Saw cut and grout as needed.
- Goal to develop standardized sizes and shapes.





Technical Issue

Geometry and Fit – Existing joint

- Irregular longitudinal joint (existing) - Potential for fit problems
- **Decision:** Saw cut existing longitudinal joint
- Field decision to saw cut some of the new panels to improve fit

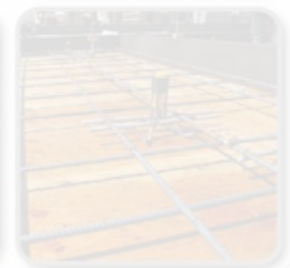




Technical Issue

Lifting Decisions

- Steel reinforcement to support panel weight during lifting.
- **Decision:** Reusable swivel lifting devices used for heavy load, angular load capacity and smaller hole.

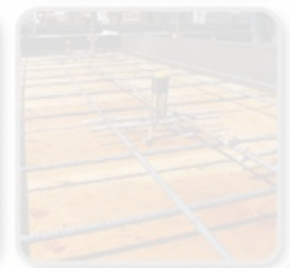
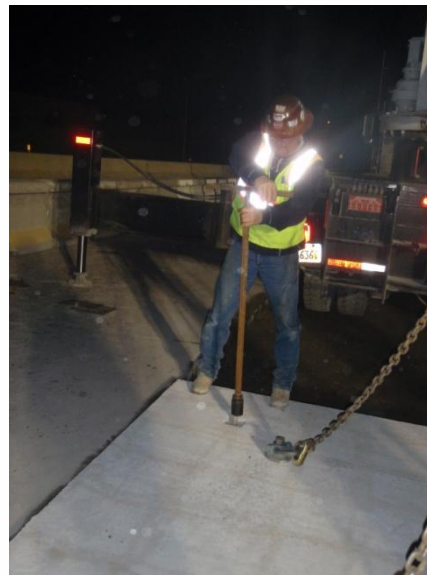
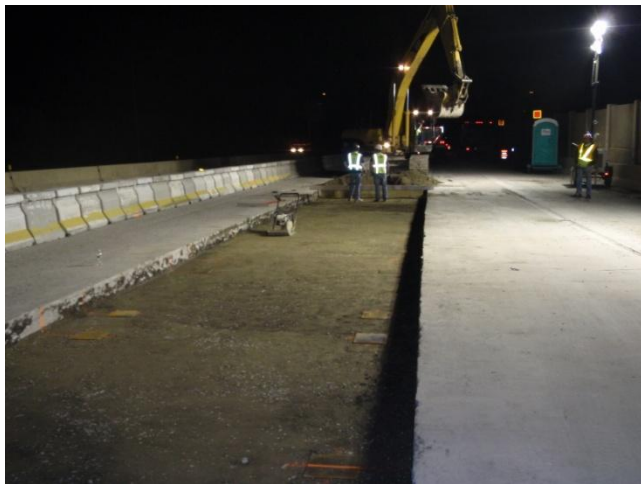




Technical Issue

Grade preparation, Profile Leveling

- Goal to minimize time preparing grade and placing panels.
- **Decision:** Adjust panel elevation using leveling screws.
- **Decision:** Eliminate sand bed.
- **Decision:** Urethane or concrete grout injection under panels.

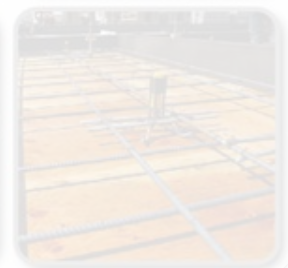




Technical Issue

Grout Materials

- Provide Grout below panels to fill any voids.
- Prototype tests show 100% coverage for urethane and concrete grout options. Field test showed both materials performed as expected over winter.
- **Decision:** Both materials acceptable. Urethane chosen for this project for shorter cure time.

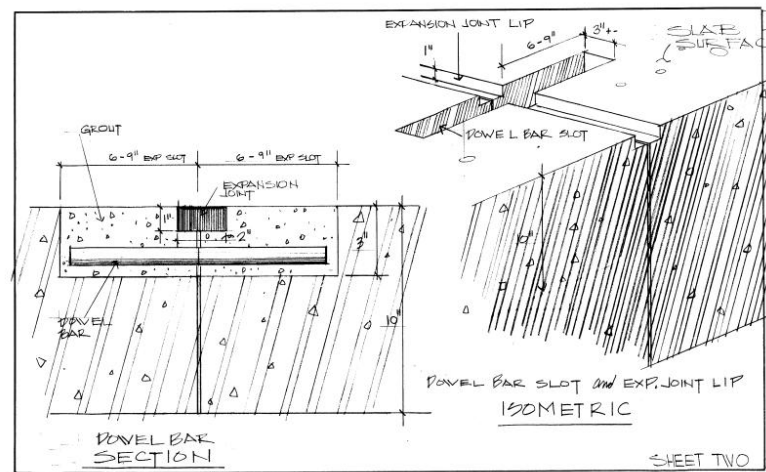


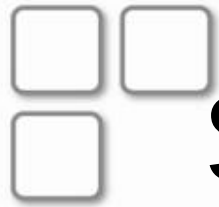


Technical Issue

Load Transfer Devices

- Existing pavement does not have Load Transfer Devices. Adjacent lane has distress.
- Question: Do we need LTD and will they cause damage to adjacent panels?
- **Decision:** Provide load transfer devices on transverse joints only.
- **Decision:** Saw-cut LTD after placement for better alignment.





Summary of Design Decisions

- Cast 12 ft x 12 ft square panels (uniform size)
- Use leveling screw to adjust profile and elevation
- Reusable swivel lifting devices with reinforced panels
- Urethane grout below panels
- Saw-cut load transfer devices on transverse joints





Questions ?

